

WHAT IS CLAIMED IS:

- 1
- 2 **1.** A device comprising:
- 3 a plurality of shape memory wires woven together to form a body suitable for
- 4 implantation into an anatomical structure, the body having first and second
- 5 ends, the shape memory wires crossing each other to form a plurality of
- 6 angles, at least one of the angles being obtuse, and both ends of at least
- 7 one shape memory wire being located proximate one end of the body;
- 8 wherein the value of the at least one obtuse angle may be increased by axially
- 9 compressing the body.
- 10
- 11 **2.** The device of claim 1, wherein the shape memory wires comprise nitinol.
- 12
- 13 **3.** The device of claim 1, wherein the shape memory wires comprise FePt, FePd or
- 14 FeNiCoTi.
- 15
- 16 **4.** The device of claim 1, wherein the shape memory wires comprise FeNiC, FeMnSi
- 17 or FeMnSiCrNi.
- 18
- 19 **5.** The device of claim 1, wherein the shape memory wires each have a diameter
- 20 ranging in size from about 0.006 inches to about 0.012 inches.
- 21
- 22 **6.** The device of claim 1, wherein the plurality of shape memory wires includes at
- 23 least 6 shape memory wires.
- 24
- 25 **7.** The device of claim 1, wherein the body has a tubular shape with a substantially
- 26 uniform diameter.
- 27
- 28 **8.** The device of claim 1, wherein the body has a tapered shape with a diameter that
- 29 decreases from one end of the body to the other end of the body.
- 30

- 1 9. The device of claim 1, wherein the body has a generally hourglass shape.
- 2
- 3 10. The device of claim 1, wherein the body is hand woven.
- 4
- 5 11. The device of claim 1, wherein the body is machine woven.
- 6
- 7 12. The device of claim 1, further comprising a graft material attached to the body.
- 8
- 9 13. The device of claim 12, wherein the graft material comprises woven polyester.
- 10
- 11 14. The device of claim 12, wherein the graft material comprises Dacron.
- 12
- 13 15. The device of claim 12, wherein the graft material comprises polyurethane.
- 14
- 15 16. The device of claim 12, wherein the graft material comprises PTFE.
- 16
- 17 17. The device of claim 12, wherein the graft material partially covers the body.
- 18
- 19 18. The device of claim 1, further comprising:
- 20 a first tube configured to accept a guide wire; and
- 21 a second tube configured to fit over the first tube.
- 22
- 23 19. The device of claim 18, wherein the second tube is placed over the first tube, one
- 24 end of the body is secured to the first tube and the other end of the body is secured to the
- 25 second tube.
- 26
- 27 20. A device comprising:
- 28 a body suitable for implantation into an anatomical structure, the body having a
- 29 first end, a second end and being defined by at least n shape memory
- 30 wires, wherein n is greater than one, the n shape memory wires being

1 arranged such that the body comprises a first portion, the first portion
2 comprising a first woven portion and at least one strut, the shape memory
3 wires of the first woven portion crossing each other to form a plurality of
4 angles, at least one of the angles being obtuse, and both ends of at least
5 one shape memory wire being located proximate one end of the body;
6 wherein the value of the at least one obtuse angle may be increased by axially
7 compressing the body.
8

9 21. The device of claim 20, wherein the shape memory wires comprise nitinol.
10

11 22. The device of claim 20, wherein the shape memory wires comprise FePt, FePd or
12 FeNiCoTi.
13

14 23. The device of claim 20, wherein the shape memory wires comprise FeNiC,
15 FeMnSi or FeMnSiCrNi.
16

17 24. The device of claim 20, wherein the body further comprises a second portion
18 adjacent the first portion, the second portion comprising a second woven portion, and the
19 second portion having $n + x$ shape memory wires, wherein x is at least one.
20

21 25. The device of claim 20, wherein the first portion comprises a first woven portion
22 separated from a second woven portion by multiple first struts.
23

24 26. The device of claim 25, wherein the first portion has a generally domed shape.
25

26 27. The device of claim 25, wherein the first woven portion has a generally domed
27 shape and the multiple first struts are bent slightly so as to increase the self-anchoring
28 capability of the body in an anatomical structure.
29

1 28. The device of claim 25, wherein the first portion further comprises a third woven
2 portion separated from the second woven portion by multiple second struts, and wherein
3 the first and third woven portions have generally domed shapes.

4
5 29. The device of claim 20, further comprising a graft material attached to the body.

6
7 30. The device of claim 29, wherein the graft material comprises woven polyester.

8
9 31. The device of claim 29, wherein the graft material comprises Dacron.

10
11 32. The device of claim 29, wherein the graft material comprises polyurethane.

12
13 33. The device of claim 29, wherein the graft material comprises PTFE.

14
15 34. The device of claim 29, wherein the graft material partially covers the body.

16
17 35. The device of claim 20, further comprising:
18 a first tube configured to accept a guide wire; and
19 a second tube configured to fit over the first tube.

20
21 36. The device of claim 35, wherein the second tube is placed over the first tube, one
22 end of the body is secured to the first tube and the other end of the body is secured to the
23 second tube.

24
25 37. A device comprising:
26 a plurality of biodegradable filaments woven together to form a self-expanding
27 body suitable for implantation into an anatomical structure, the self-
28 expanding body having first and second ends, the biodegradable filaments
29 crossing each other to form a plurality of angles, at least one of the angles
30 being obtuse;

1 wherein the value of the at least one obtuse angle may be increased by axially
2 compressing the self-expanding body.

3
4 38. A method of creating a body suitable for implantation into an anatomical
5 structure, the body having two ends, the method comprising:

6 bending the shape memory wires in a plurality of shape memory wires to create
7 bent portions in the shape memory wires, the bent portions being arranged
8 to define one end of the body, each shape memory wire having two ends;
9 and

10 weaving the ends of the shape memory wires to create the body such that the
11 shape memory wires cross each other to form a plurality of angles, at least
12 one of the angles being obtuse,

13 wherein the value of the at least one obtuse angle may be increased by axially
14 compressing the body.

15
16 39. The method of claim 38, wherein the bent portions are bends.

17
18 40. The method of claim 38, wherein the bent portions are loops.

19
20 41. The method of claim 38, wherein the shape memory wires comprise nitinol.

21
22 42. The method of claim 38, wherein the shape memory wires comprise FePt, FePd or
23 FeNiCoTi.

24
25 43. The method of claim 38, wherein the shape memory wires comprise FeNiC,
26 FeMnSi or FeMnSiCrNi.

27
28 44. The method of claim 38, wherein the shape memory wires each have a diameter
29 ranging in size from about 0.006 inches to about 0.012 inches.
30

1 45. The method of claim 38, wherein the plurality of shape memory wires includes at
2 least 6 shape memory wires.

3
4 46. The method of claim 38, wherein the body has a tubular shape with a substantially
5 uniform diameter.

6
7 47. The method of claim 38, wherein the body has a tapered shape with a diameter
8 that decreases from one end of the body to the other end of the body.

9
10 48. The method of claim 38, wherein the body has a generally hourglass shape.

11
12 49. The method of claim 38, wherein the weaving is by hand.

13
14 50. The method of claim 38, wherein the weaving is by machine.

15
16 51. A method of creating a body suitable for implantation into an anatomical
17 structure, the body having two ends, the method comprising:

18 providing a weaving system comprising:

19 a template having first template projections;

20 bending shape memory wires around the first template projections to create bent

21 portions in the shape memory wires, the bent portions being arranged to

22 define one end of the body, each shape memory wire having two ends; and

23 weaving the ends of the shape memory wires around the template to create the

24 body such that the shape memory wires cross each other to form a plurality

25 of angles, at least one of the angles being obtuse;

26 wherein the value of the at least one obtuse angle may be increased by axially

27 compressing the body.

28
29 52. The method of claim 51, wherein the first template projections comprise tabs.
30

- 1 53. The method of claim 51, wherein the first template projections comprise pins.
- 2
- 3 54. The method of claim 53, wherein the pins are attached to a ring engaged with the
- 4 template.
- 5
- 6 55. The method of claim 51, wherein the weaving system further comprises a first
- 7 weaving plate configured to rotate in a first direction during the weaving.
- 8
- 9 56. The method of claim 55, wherein the weaving system further comprises first
- 10 bobbins arranged on the first weaving plate, one end of each shape memory wire being
- 11 attached to each first bobbin prior to the weaving.
- 12
- 13 57. The method of claim 55, wherein the weaving system further comprises a second
- 14 weaving plate configured to rotate in a second direction during the weaving, the second
- 15 weaving plate being spaced apart from the first weaving plate.
- 16
- 17 58. The method of claim 57, wherein the weaving system further comprises second
- 18 bobbins arranged on the second weaving plate, one end of each shape memory wire being
- 19 attached to each second bobbin prior to the weaving.
- 20
- 21 59. The method of claim 51, further comprising securing the shape memory wires to
- 22 the template.
- 23
- 24 60. The method of claim 51, further comprising forming closed structures with the
- 25 ends of the shape memory wires, the closed structures being arranged to define the other
- 26 end of the body.
- 27
- 28 61. The method of claim 51, further comprising heating the body and the template.
- 29

1 62. A device for delivering an axially and radially expandable woven body having
2 two ends into an anatomical structure, comprising:

3 a first tube configured to accept a guide wire; and

4 a second tube configured to fit over the first tube;

5 wherein when the tubes are used for delivering the axially and radially expandable
6 woven body, one end of the axially and radially expandable woven body is
7 secured to the outside of the first tube and the other end of the axially and
8 radially expandable woven body is secured to the outside of the second
9 tube.
10

11 63. The device of claim 62, further comprising a guide wire configured to be placed
12 within the first tube.
13

14 64. The device of claim 62, further comprising a push-button release/lock mechanism
15 configured to secure the first tube to the second tube.
16

17 65. The device of claim 62, further comprising an end fitting having a side arm, the
18 end fitting being configured to be secured to the first tube.
19

20 66. A device for delivering an axially and radially expandable woven body having
21 two ends into an anatomical structure, comprising:

22 a first tube configured to accept a guide wire, the first tube having at least one pair
23 of first tube holes positioned proximate one end of the first tube;

24 a second tube configured to fit over the first tube, the second tube having at least
25 one pair of second tube holes positioned proximate one end of the second
26 tube;

27 a first securing wire configured to be threaded through the at least one pair of first
28 tube holes; and

29 a second securing wire configured to be threaded through the at least one pair of
30 second tube holes;

1 wherein when the tubes are used for delivering the axially and radially expandable
2 woven body, one end of the axially and radially expandable woven body is
3 secured to the outside of the first tube with the first securing wire and the
4 other end of the axially and radially expandable woven body is secured to
5 the outside of the second tube with the second securing wire.

6
7 67. An occluding system comprising:
8 a plurality of shape memory wires woven together to form a body useful for
9 occluding an anatomical structure, the body having first and second ends,
10 both ends of at least one shape memory wire being located proximate one
11 end of the body, the shape memory wires crossing each other to form a
12 plurality of angles, at least one of the angles being obtuse;
13 wherein the value of the at least one obtuse angle may be increased by axially
14 compressing the body.

15
16 68. A device comprising:
17 a body suitable for implantation into an anatomical structure, the body having an
18 axis, a first end and a second end, wherein the body comprises a shape
19 memory wire having a first segment and a second segment, the segments
20 being separated by a bend in the shape memory wire located proximate
21 one end of the body, the first segment extending helically in a first
22 direction around the axis toward the other end of the body, the second
23 segment extending helically in a second direction around the axis toward
24 the other end of the body, and the first and second segments crossing each
25 other in a plurality of locations.

26
27 69. A device comprising:
28 a body suitable for implantation into an anatomical structure, the body having a
29 first end and a second end, wherein the body comprises a shape memory
30 wire having a first segment and a second segment, the segments being

1 separated by a bend in the wire located proximate one end of the body, the
2 first segment and second segments being arranged to form loops and
3 twisted segments such that at least two contiguous loops are separated
4 from another loop by a twisted segment.

5
6 ~~70.~~ A device comprising:

7 a body suitable for implantation into an anatomical structure, the body having two
8 ends and comprising a shape memory wire having a first segment and a
9 second segment, the segments being separated by a bend in the wire
10 located proximate one end of the body, the segments being positioned
11 adjacent to each other in loop-defining locations, the segments also
12 extending between the loop-defining locations in spaced relation to each
13 other so as form at least two loops, at least one of the at least two loops
14 having a compressed shape.

15 add
16 C2
17

09490243-020100